

FIG. 1

ENCODER DESCRIPTION

| | |
|-----|--|
| 201 | The encoder obtains a reference image frame. |
| 202 | The encoder encodes the image frame from step 201 and transmits it to the decoder. |
| 203 | The encoded image from the previous step is reconstructed by the encoder, in the same manner as the decoder will. |
| 204 | The encoder determines the structural information, i.e. segments, the reconstructed image from step 204. Alternatively, the encoder segments the original reference image frame from step 201. |
| 205 | The segments determined in step 204 are ordered by the encoder, in the same manner as the decoder will. |
| 206 | The encoder obtains a new image frame. |
| 207 | The motion related information of each segment is determined by motion matching. |
| 208 | The encoder encodes the motion information. |
| 209 | Based on the motion information from step 208, previously hidden regions, also known as the background residue, in the first frame may be exposed in the second frame. |
| 210 | The encoder orders the background residue locations, in the same manner as the decoder will. |
| 211 | The encoder attempts to fill each of the background residue locations (i.e., predict the background residues) from steps 209 and 210; |
| 212 | The encoder determines the difference between the predicted fill and the actual fill for each of the background residue areas. |
| 213 | The encoder determines the local residue areas in the second image frame, from the segment motion information. |
| 214 | The encoder orders the local residues from step 213, in the same manner as the decoder will. |
| 215 | The encoder encodes the background and local residues from steps 212 and 214. |
| 216 | <p>If the image can be reasonably reconstructed primarily from the motion information, with assistance from the background residue and the local segment residues, the encoder transmits the following information, and reconstructs the second frame, as the decoder will, and continues at step 206:</p> <ul style="list-style-type: none"> a. Flag denoting that the second frame is not a keyframe b. The motion related information for the segments c. Special instructions for segments d. The background residue information with flags denoting coding e. The local residue information along with flags denoting coding |
| 217 | If the image cannot be reconstructed in relation to the reference frame, the image is encoded as a key frame, a flag is transmitted to so inform the decoder, and the encoder continues at step 202. |

FIG. 2

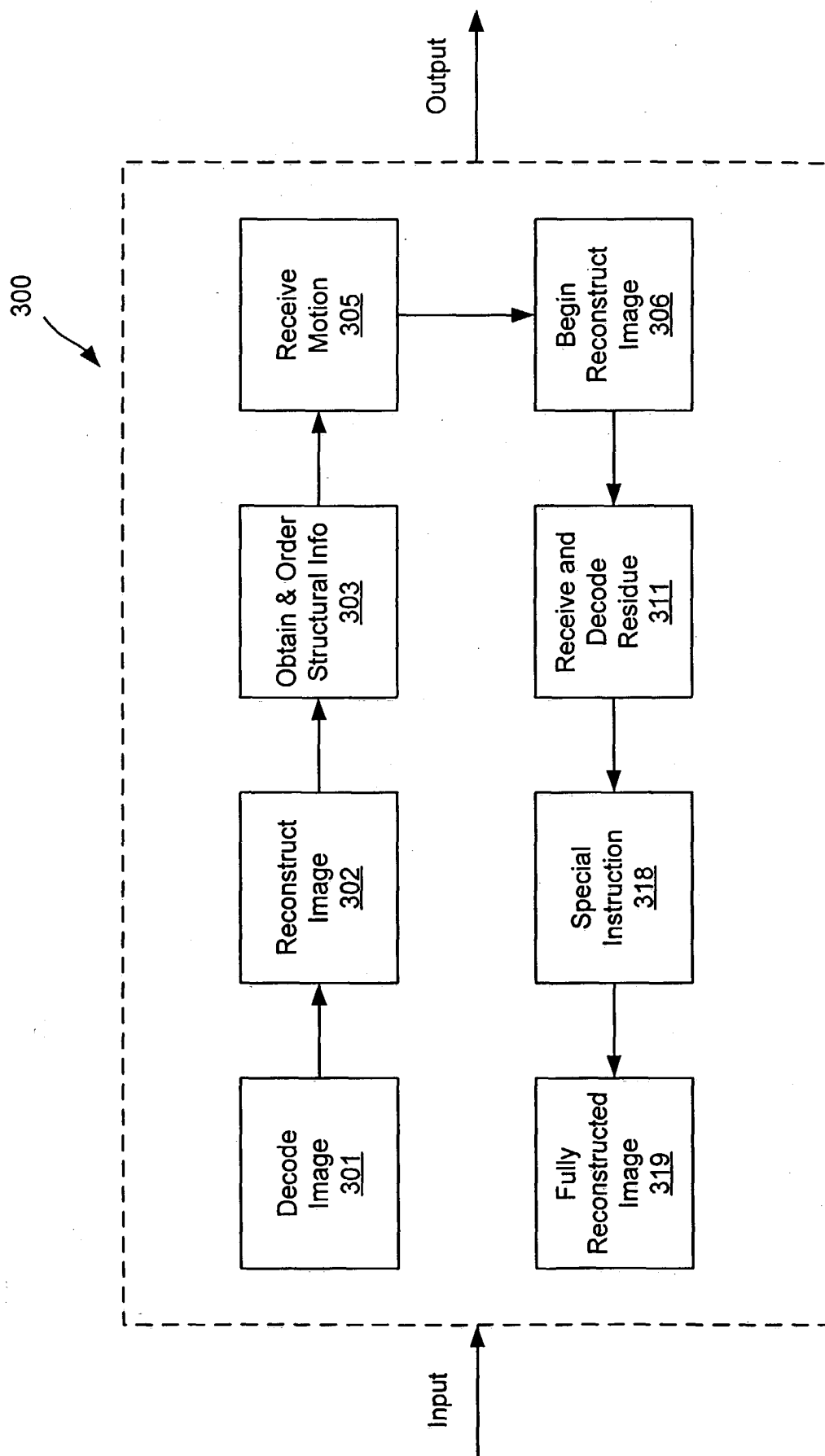


FIG. 3

DECODER DESCRIPTION

| | |
|-----|---|
| 401 | The decoder receives an encoded image frame. |
| 402 | The encoded image frame from step 401 is reconstructed by the decoder in the same manner as the encoder. |
| 403 | The reconstructed image frame from step 402 is segmented and ordered by the decoder in the same manner as the encoder. |
| 404 | The decoder receives a flag from the encoder stating whether the subsequent frame is a keyframe, i.e. not represented in relation to any other frame. If so, then the decoder returns to step 401. |
| 405 | The decoder receives motion related information regarding the segments determined in step 403 from the encoder. |
| 406 | The decoder begins to reconstruct a subsequent image frame using the segments obtained in step 403 and motion related information obtained in step 404. |
| 407 | Based on the motion related information from step 404 regarding the segments determined in step 403, the decoder determines where areas, previously hidden, are now revealed, also known as the background residue. |
| 408 | The background residue locations from step 406 are ordered in the same manner as by the encoder. |
| 409 | The decoder attempts to fill the background residue locations; thereby predicting the background residue information. |
| 410 | The decoder receives additional background residue information (i.e., relative to the predicted background residue) plus flags denoting the coding method for the additional background residue information from the encoder. |
| 411 | The decoder decodes the additional background residue information. |
| 412 | The computed background residue information and the additional background residue information is added to the second image frame. |
| 413 | Based on the motion information from step 404 regarding the segments determined in step 403, the decoder determines the location of the local segment residues, if any. |
| 414 | The local segment residue locations are ordered in the same manner as by the encoder. |
| 415 | The decoder receives coded local segment residue information plus flags denoting the coding method for each local segment residue location. |
| 416 | The decoder decodes the local segment residue information. |
| 417 | The decoded local segment residue information is added to the second frame. |
| 418 | The decoder receives any special instructions and adds them to the second frame. |
| 419 | Reconstruction of the second frame is complete. |
| 420 | If there are more frames, the routine continues at step 404. |

FIG. 4

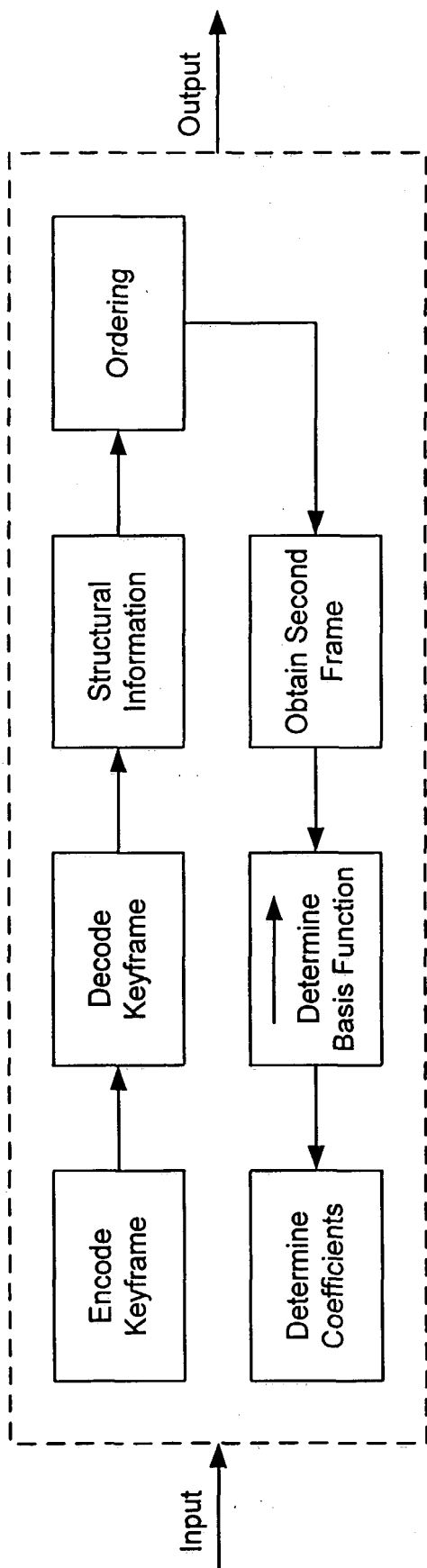


FIG. 5A

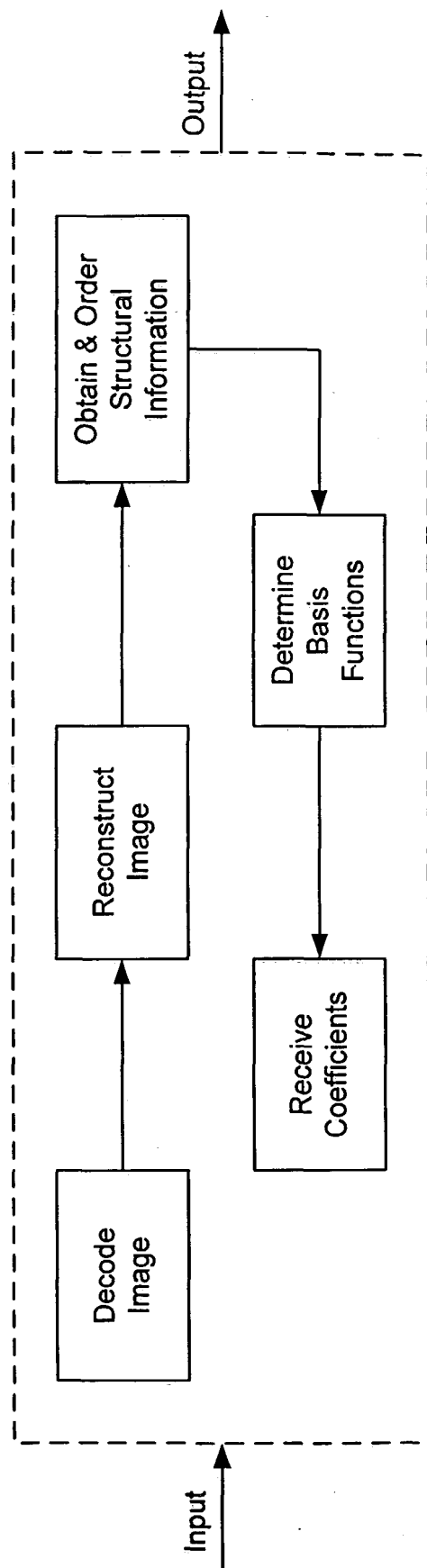


FIG. 5B

ENCODER/DECODER SYSTEM

| | Encoder | | Decoder |
|------|---|--|---|
| 601 | Obtain, encode, transmit reference frame → | | Receive reference frame |
| 602 | Reconstruct reference frame | | Reconstruct reference frame |
| 603 | Obtain Structural Information | | Obtain identical Structural Information |
| 604 | Order segments | | Order segments |
| 605 | Obtain 2nd image frame | | |
| 606 | Determine motion relation information | | |
| 606a | Group by Multi-scaling and/or prediction from previous motion related information | | |
| 606b | Predict segment motion data | | |
| 607 | Encode any motion related information relative to grouping and prediction | | |
| 608 | Determine background residue | | |
| 609 | Order background residues | | |
| 610 | Predict background residue | | |
| 611 | Determine sufficiency of prediction | | |
| 612 | Determine local residue | | |
| 613 | Order local residue locations | | |
| 614 | Encode background and local residue | | |
| 615 | Is 2nd frame keyframe? If yes, go to step 601 → | | Receive keyframe flag |
| 616 | Transmit motion related information → | | Receive motion related information |
| 616a | | | Group segments by Multi-scaling and/or prediction from previous motion related information exactly as in step 606a. |
| 616b | | | Predict segment motion data as in step 606b. |
| 617 | | | Determine and order background and local residue locations exactly as in steps 608, 609, 612, and 613 |
| 618 | | | Predict background residue as in step 610. |
| 619 | Transmit background and local residue information → | | Receive background and local residue information |
| 620 | | | Decode background and local residue information |
| 621 | Transmit special instructions → | | Receive special instructions |
| 622 | Reconstruct 2nd Frame | | Reconstruct 2nd Frame |
| 623 | Go to step 605 | | Go to step 605 |

FIG. 6

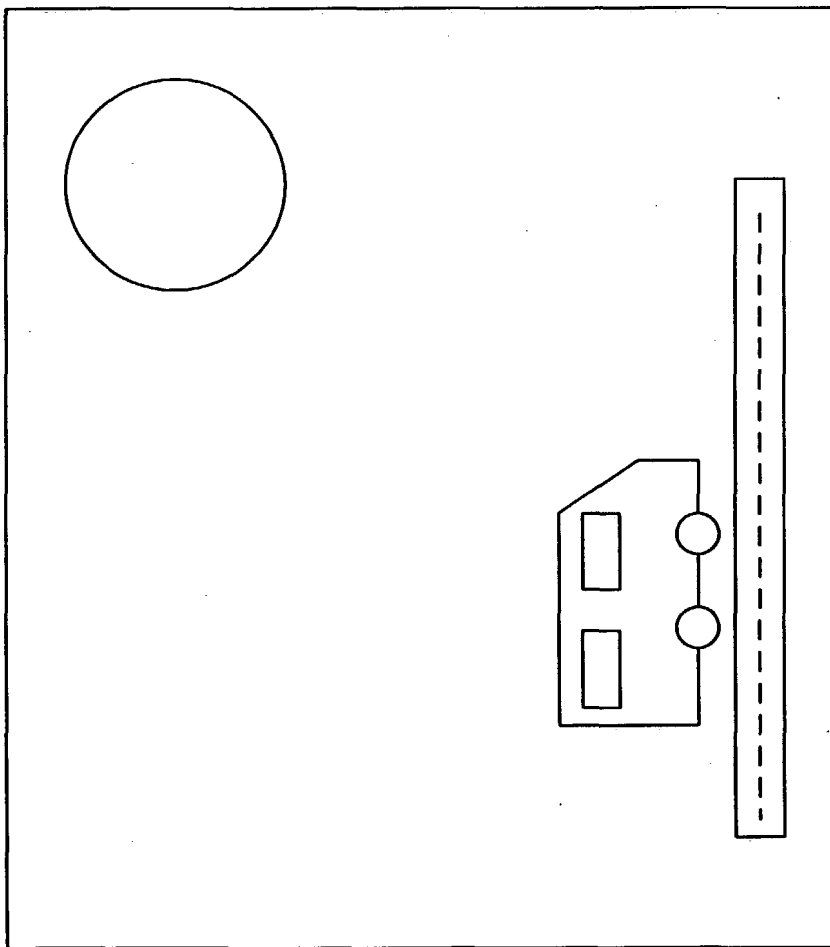


FIG. 7

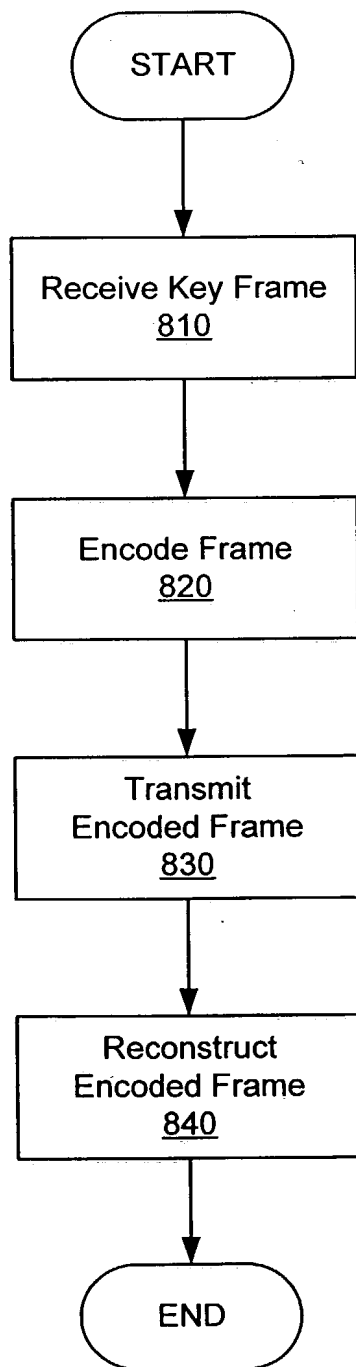


FIG. 8

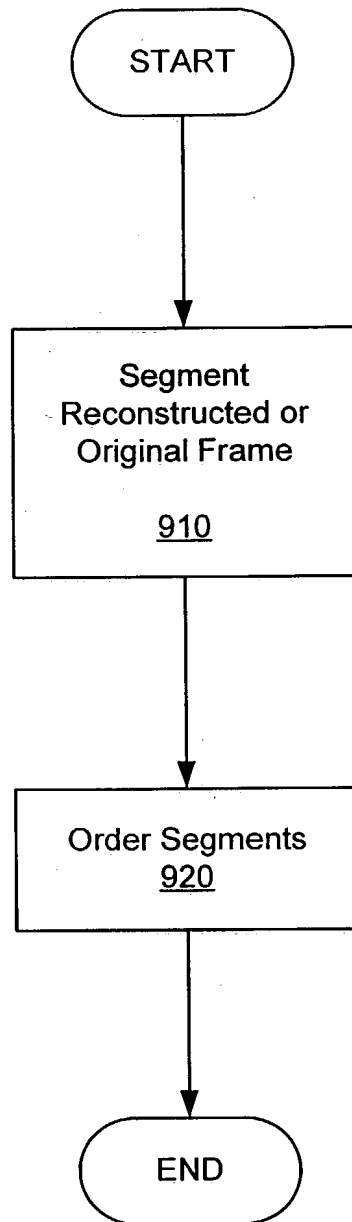


FIG. 9

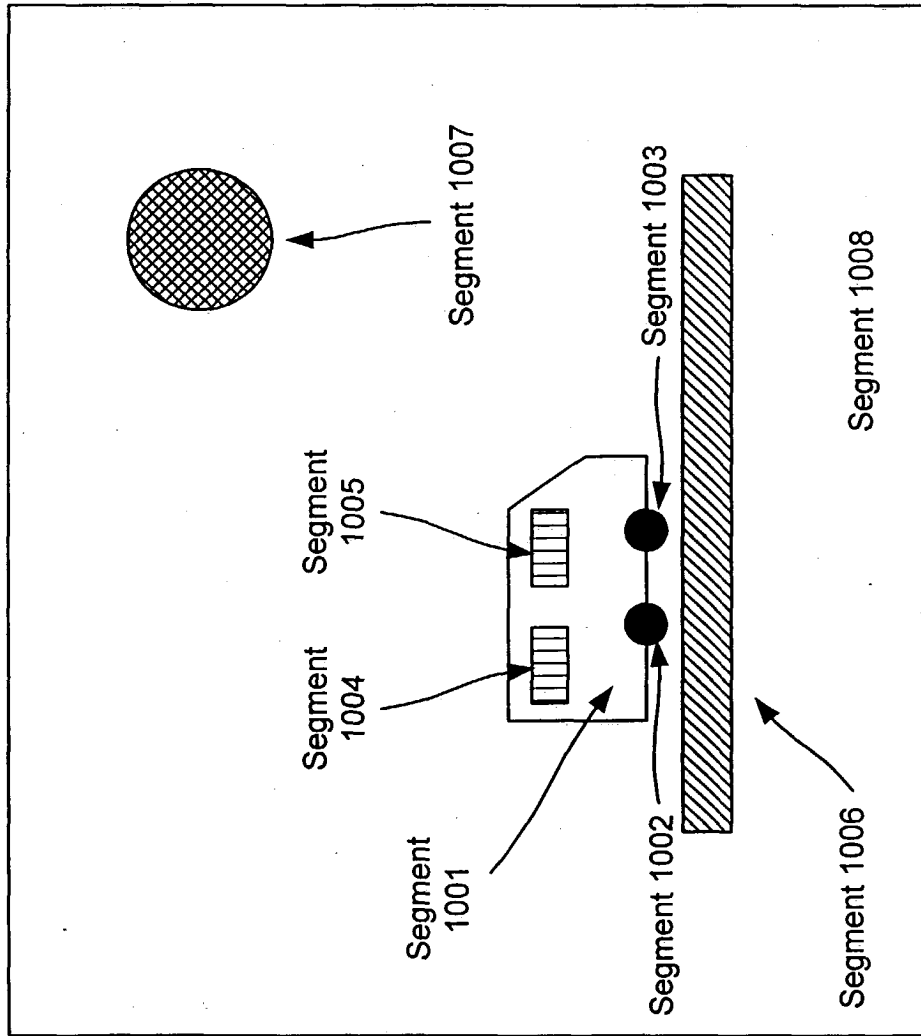


FIG. 10

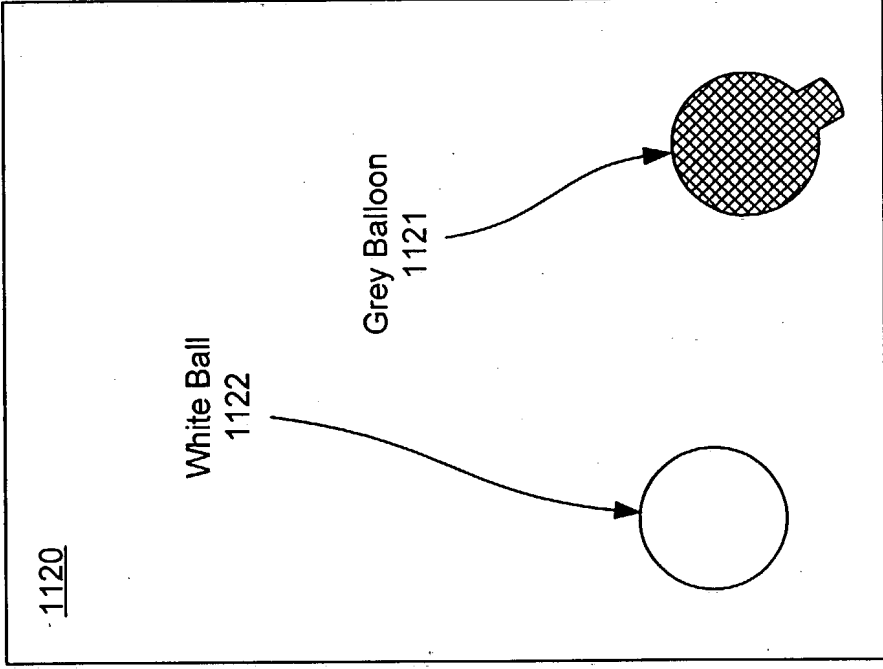
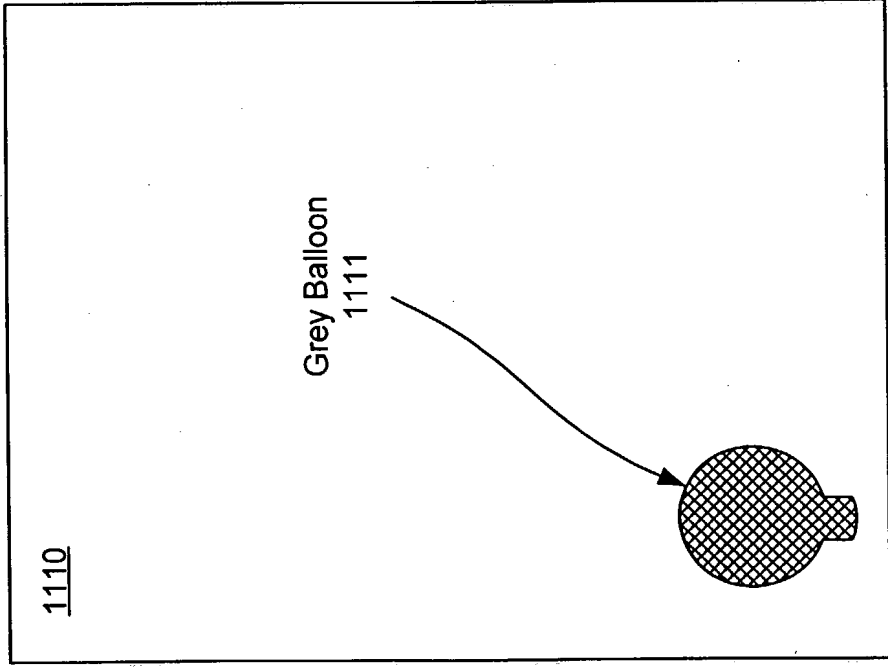


FIG. 11

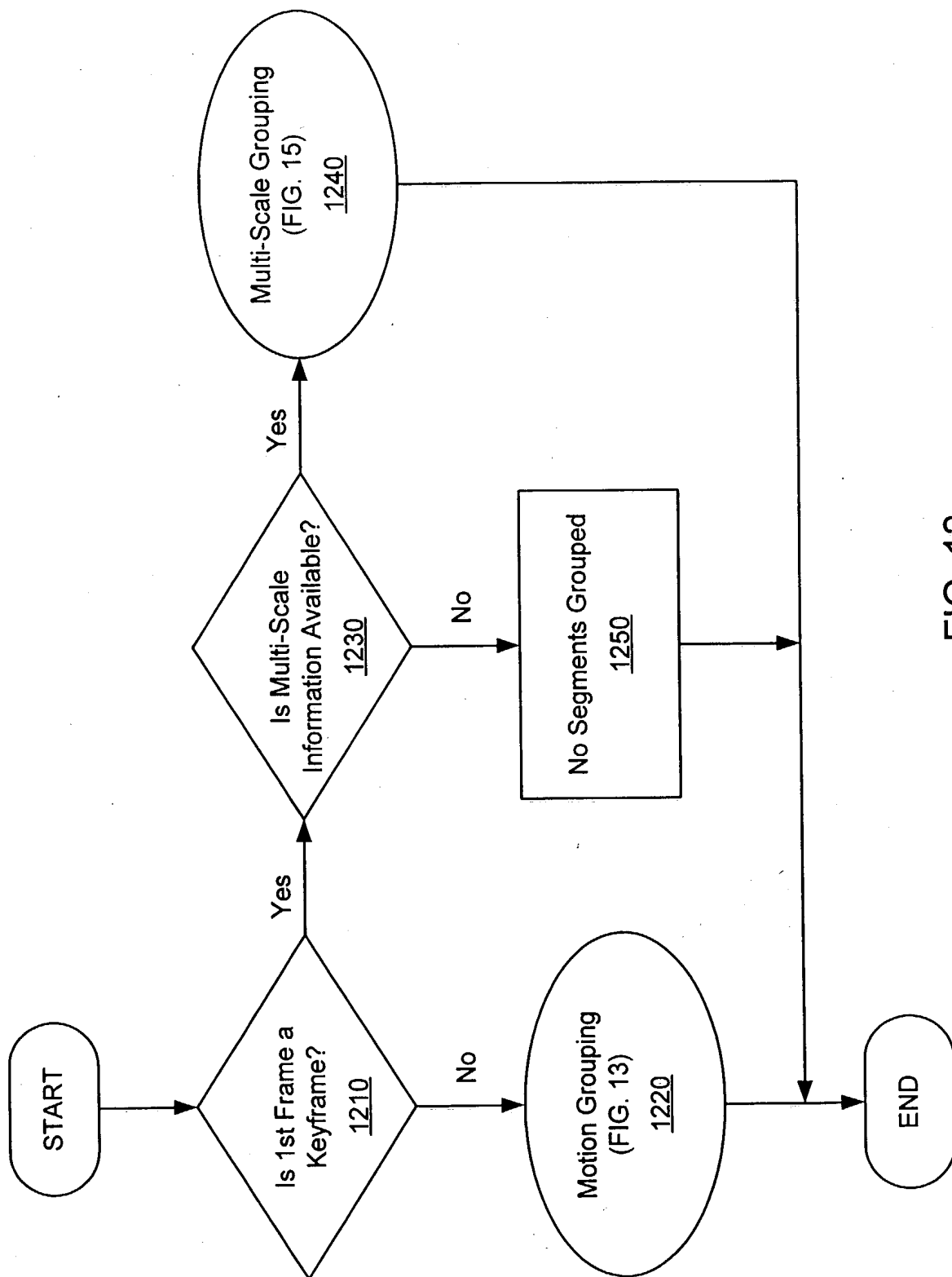


FIG. 12

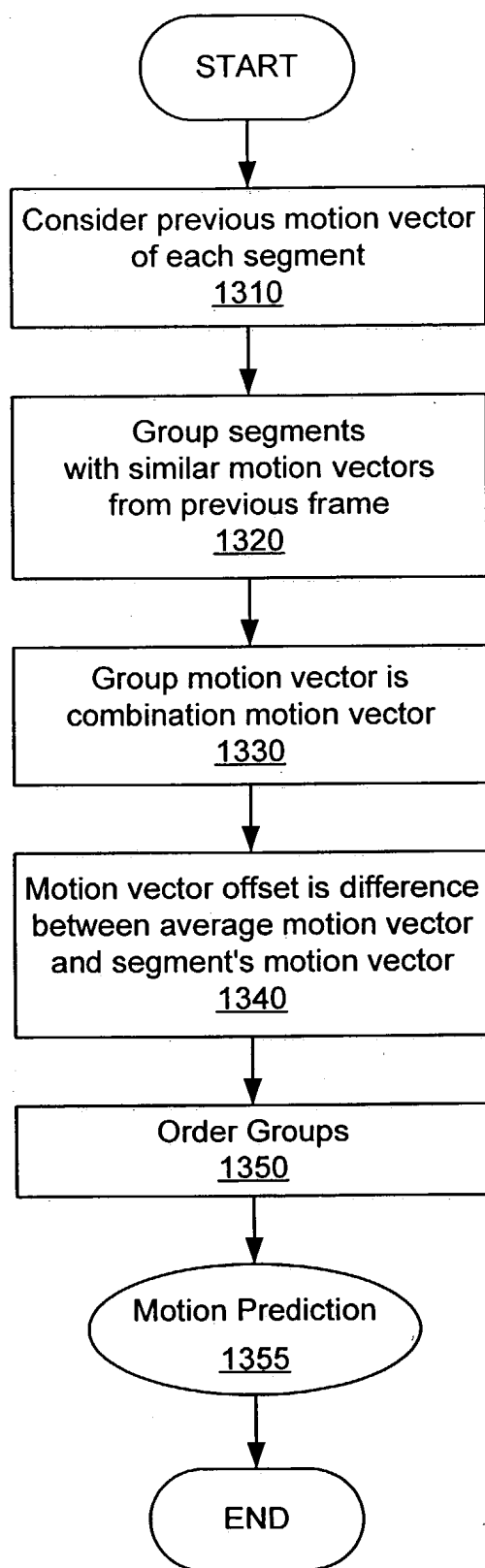


FIG. 13

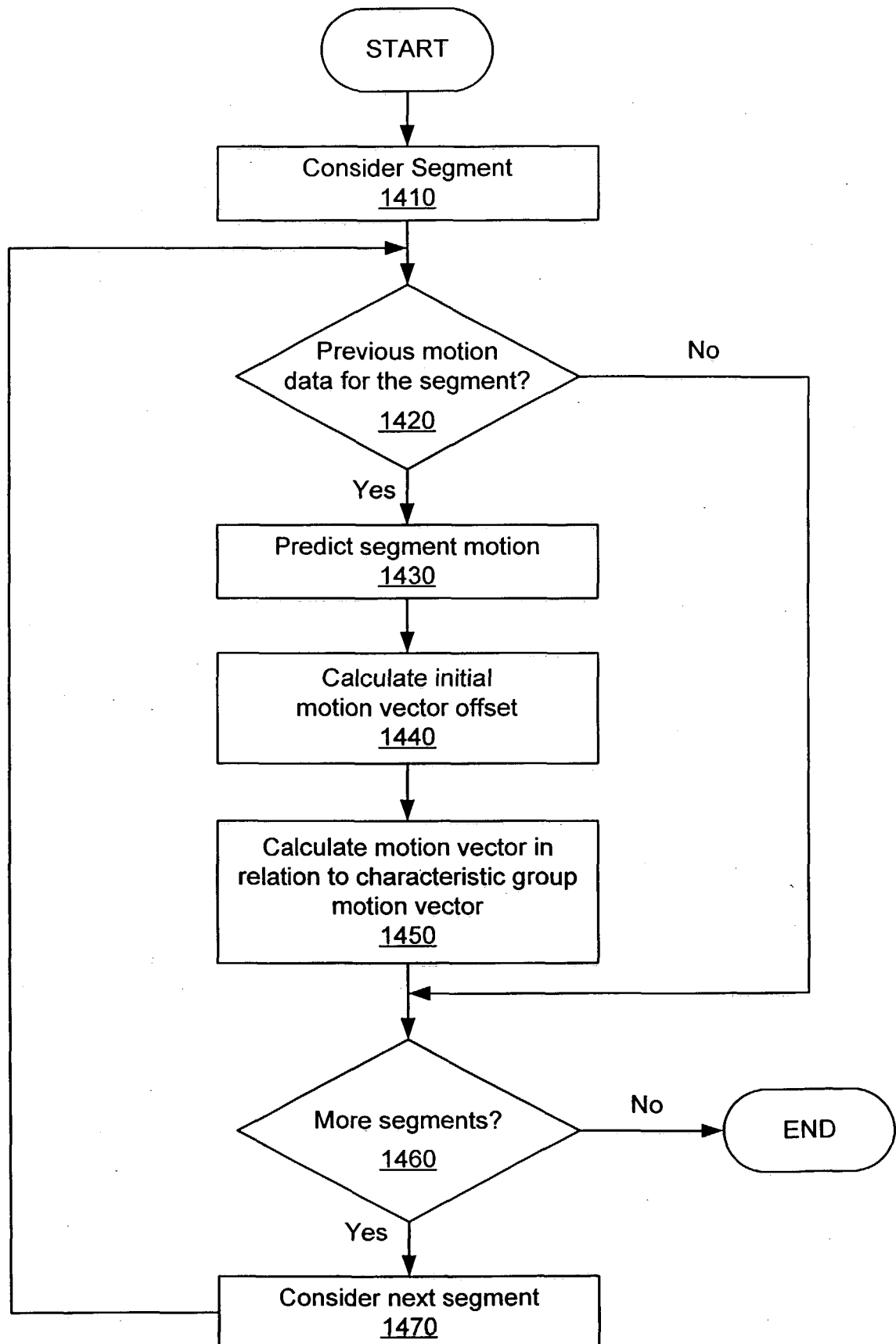


FIG. 14

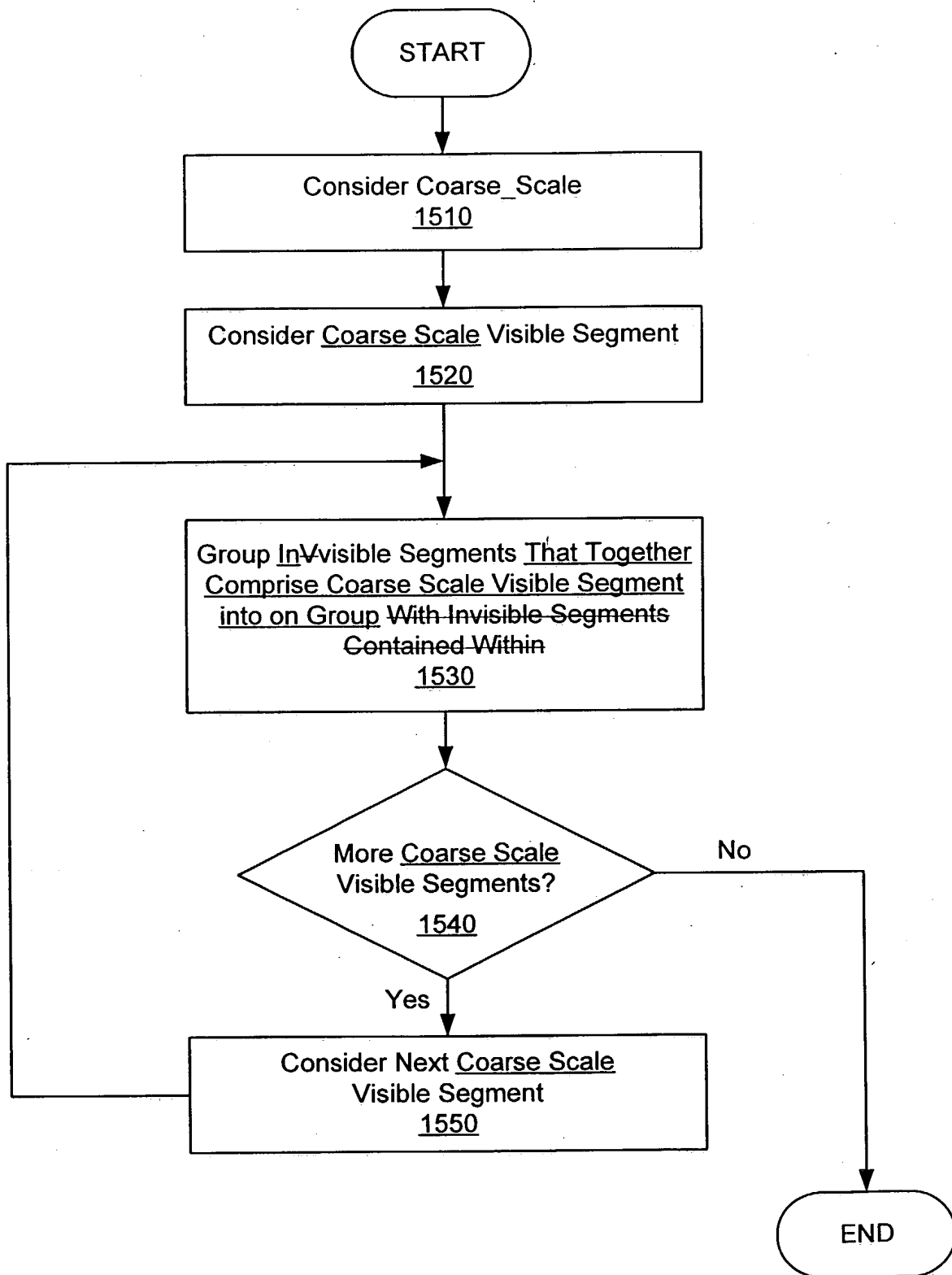


FIG. 15

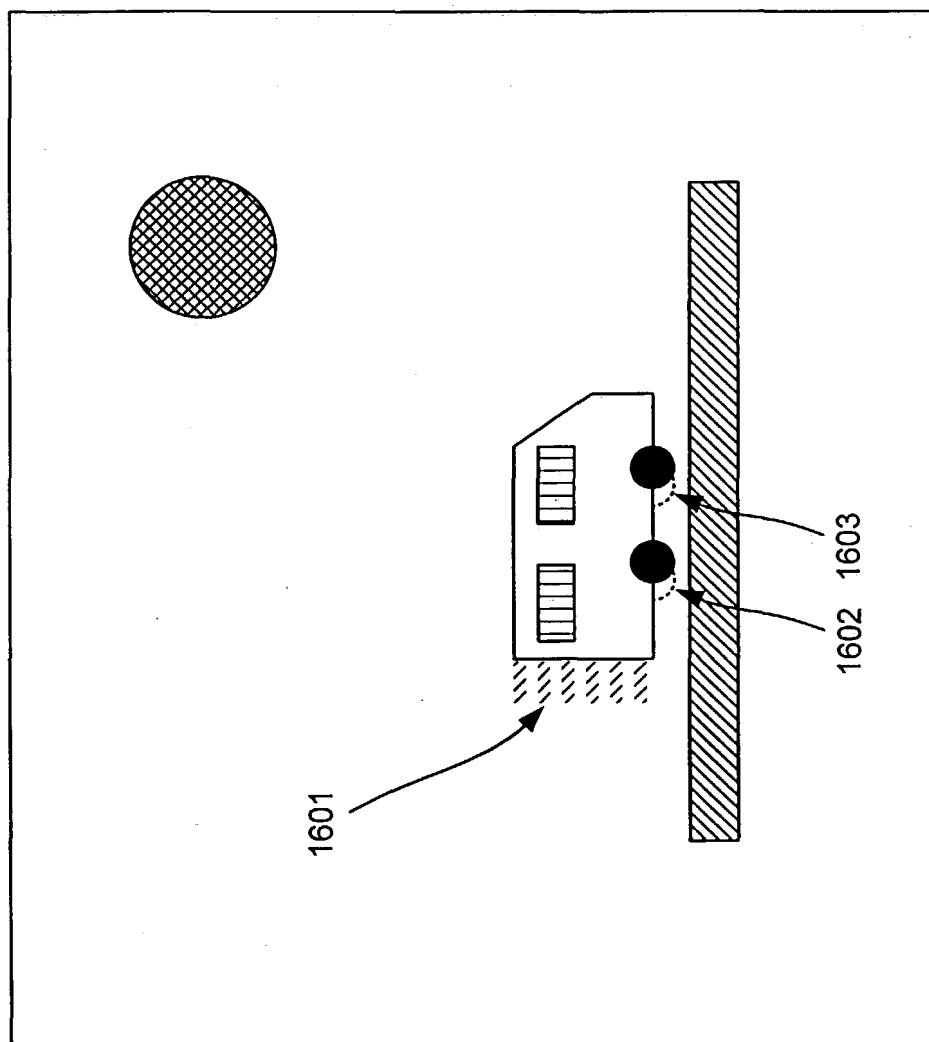


FIG. 16

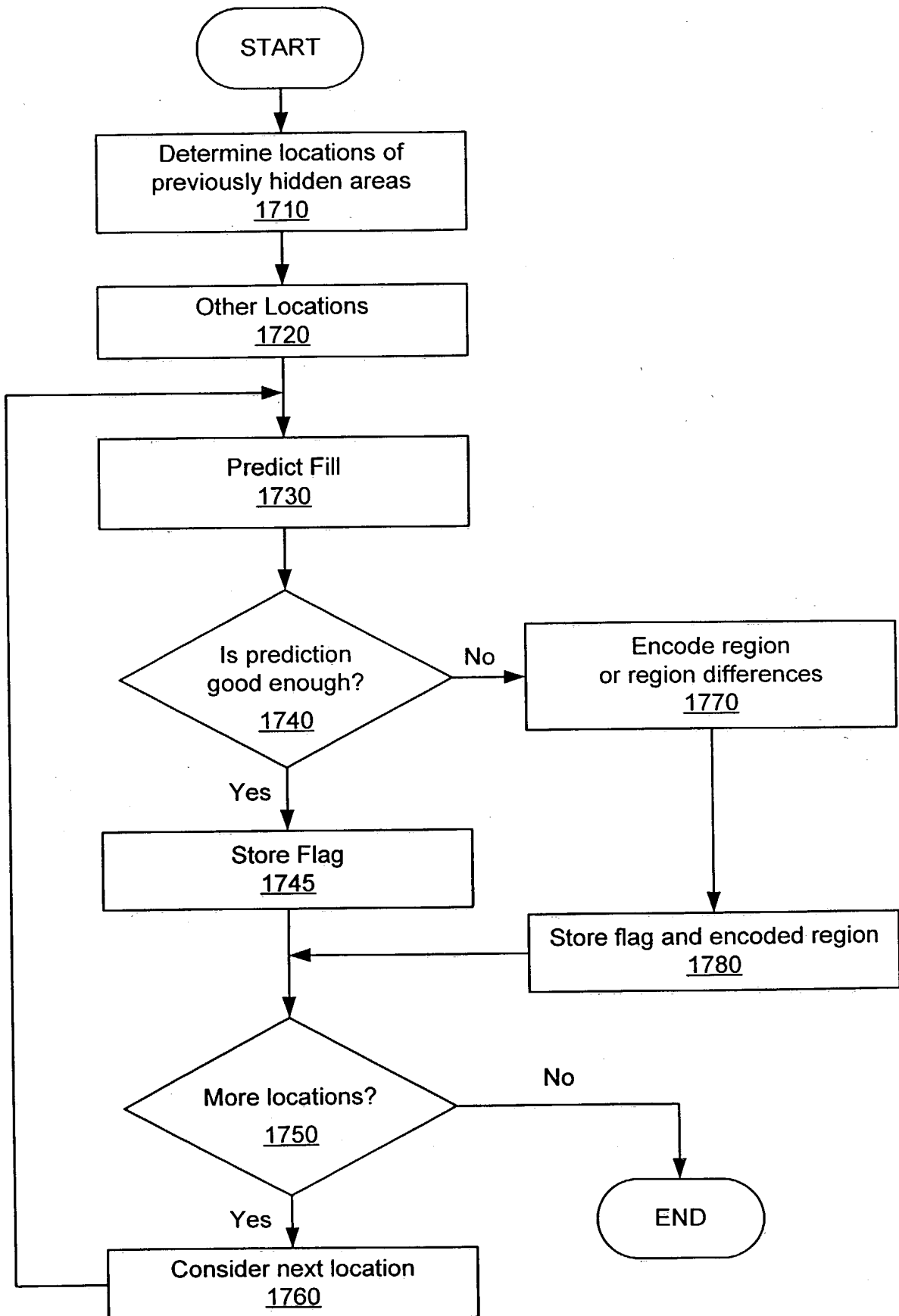


FIG. 17

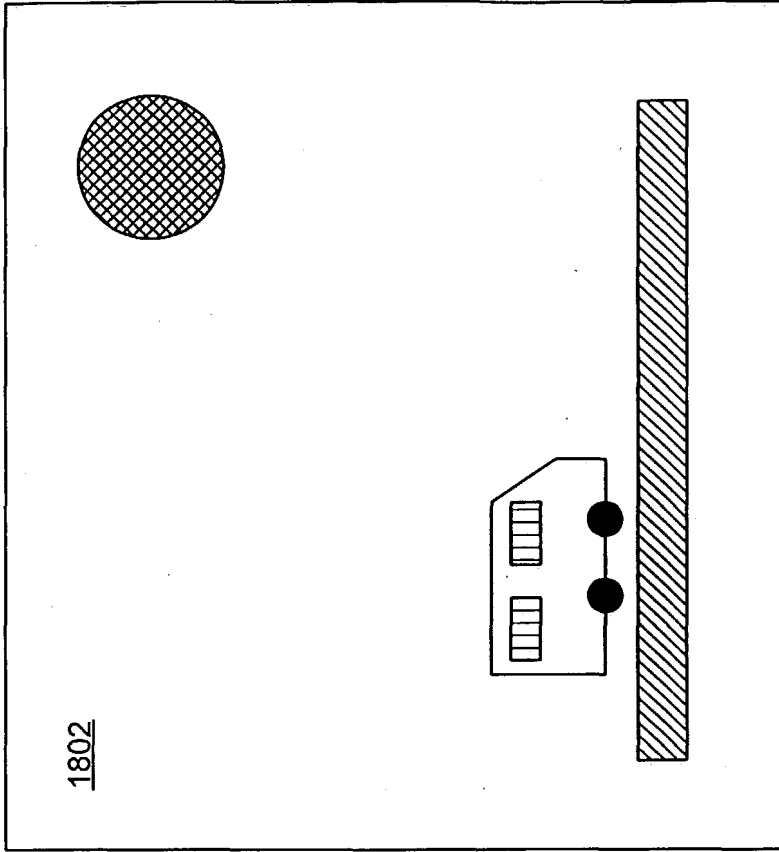
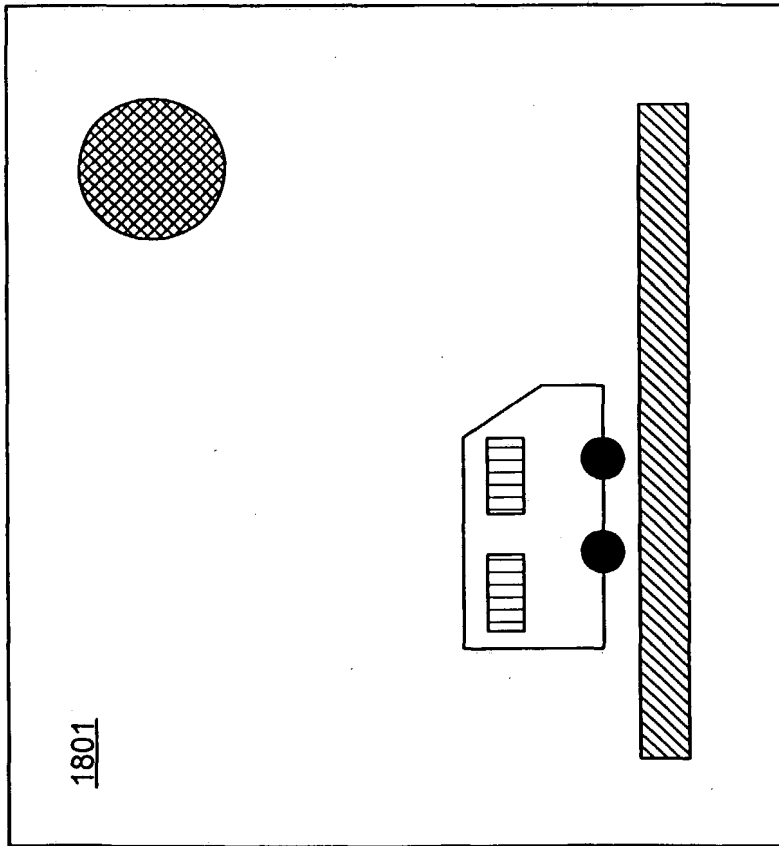


FIG. 18

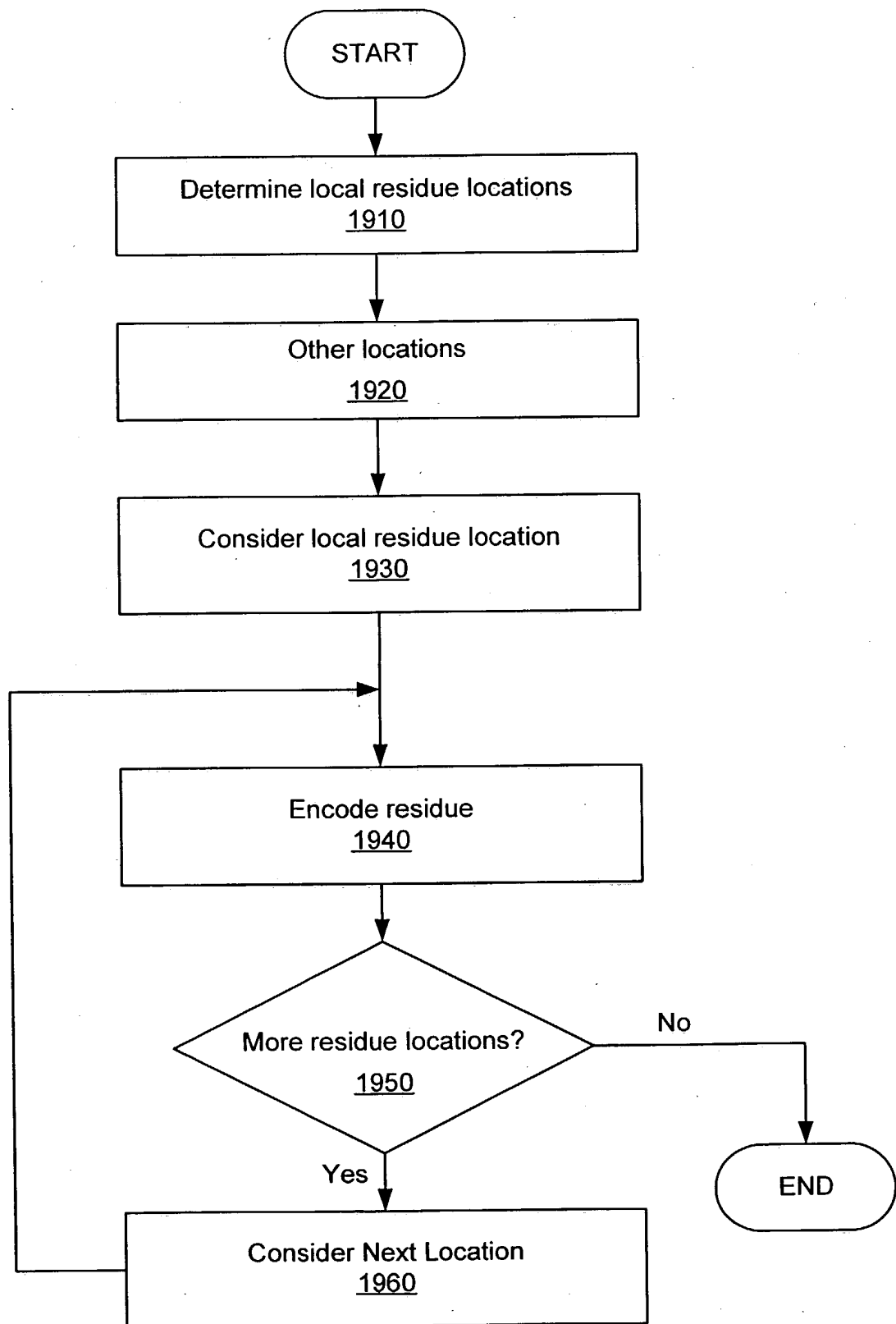


FIG. 19

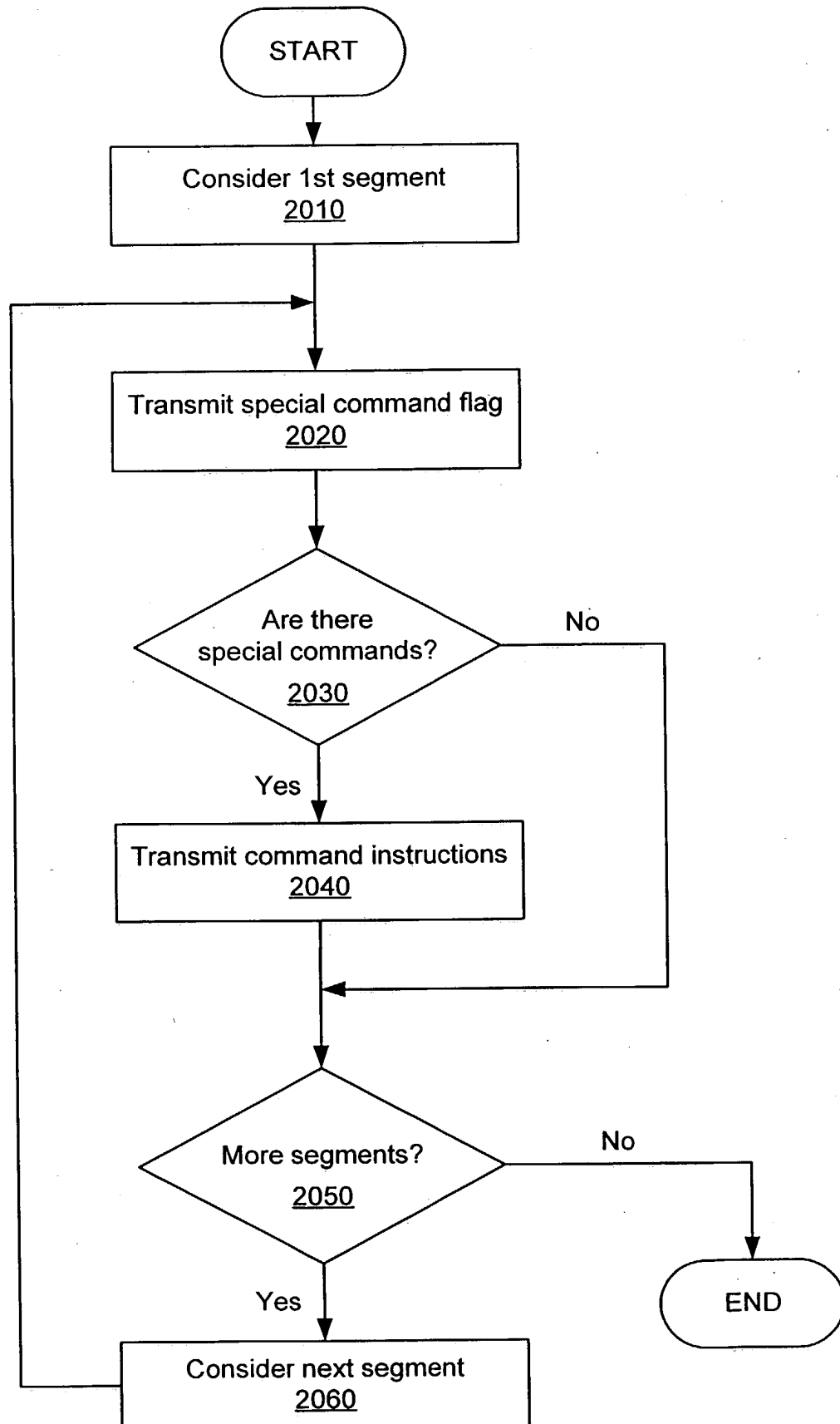


FIG. 20

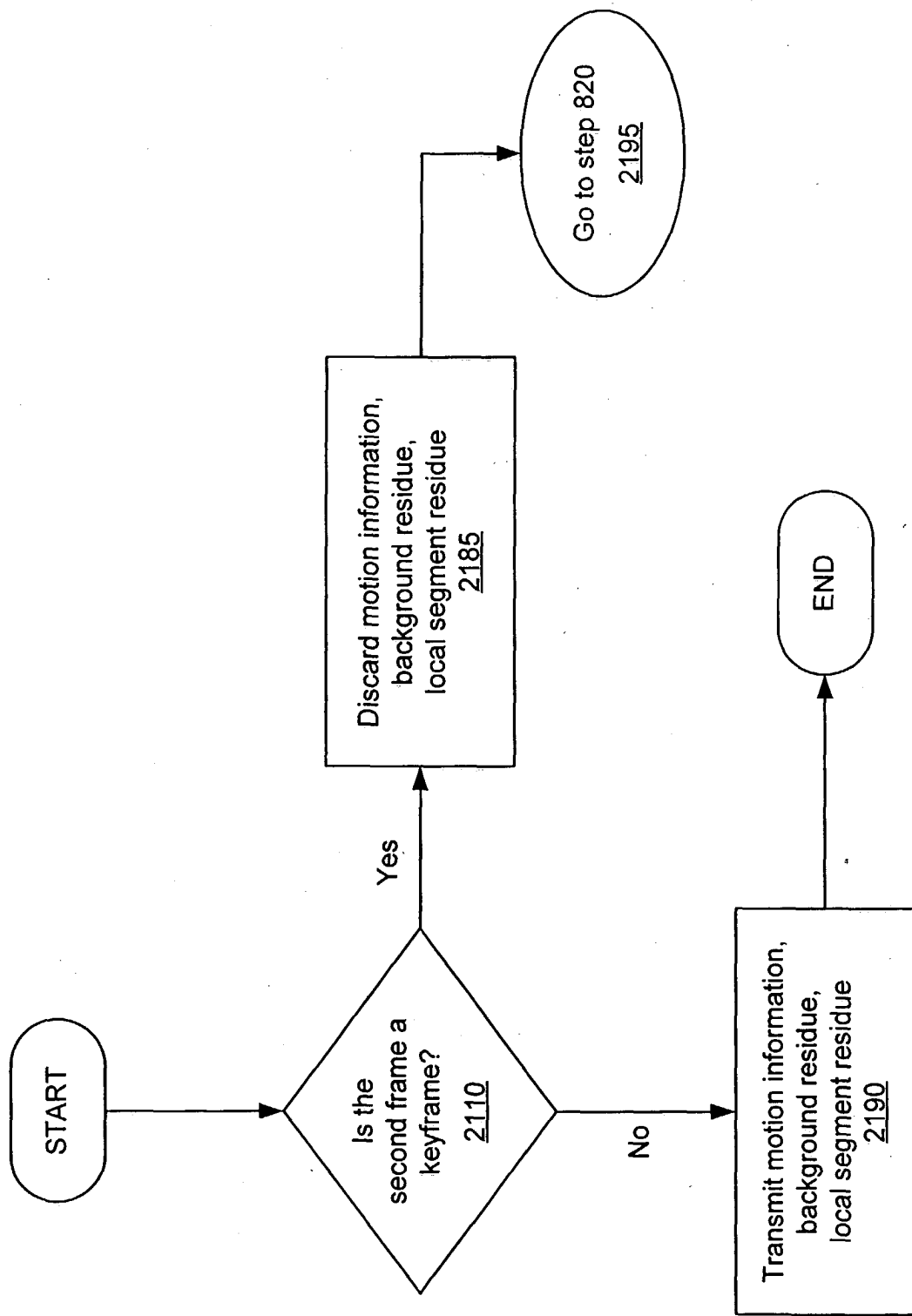


FIG. 21

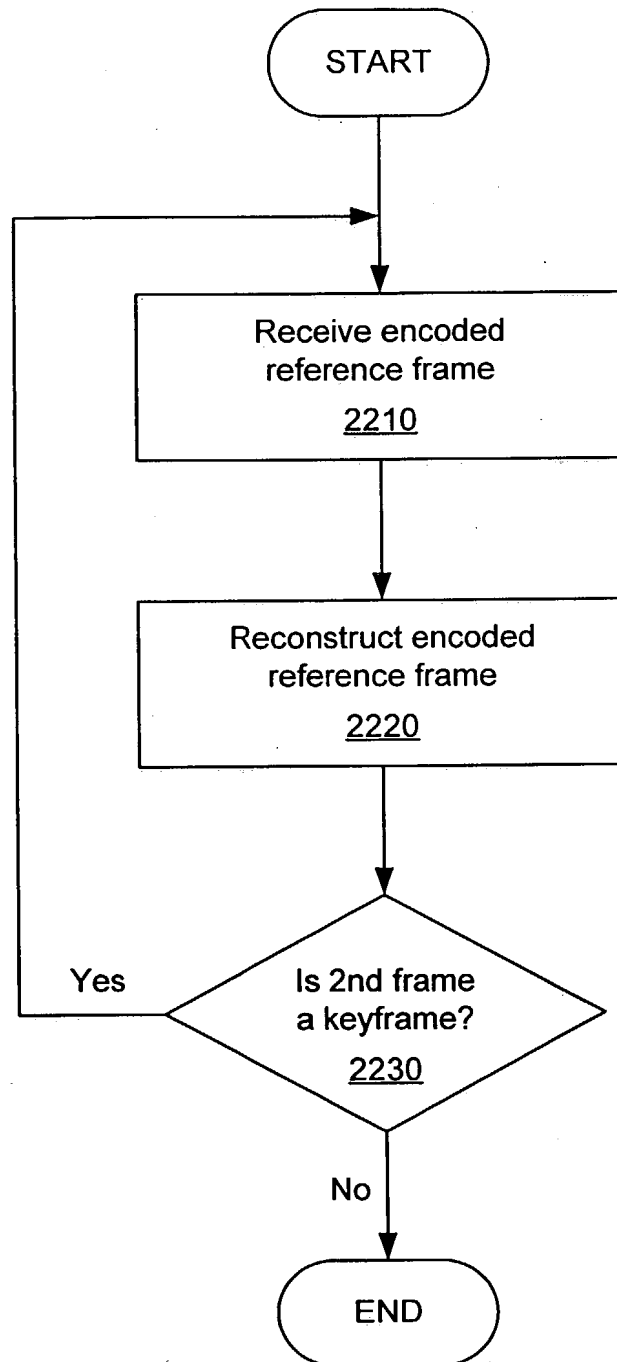


FIG. 22

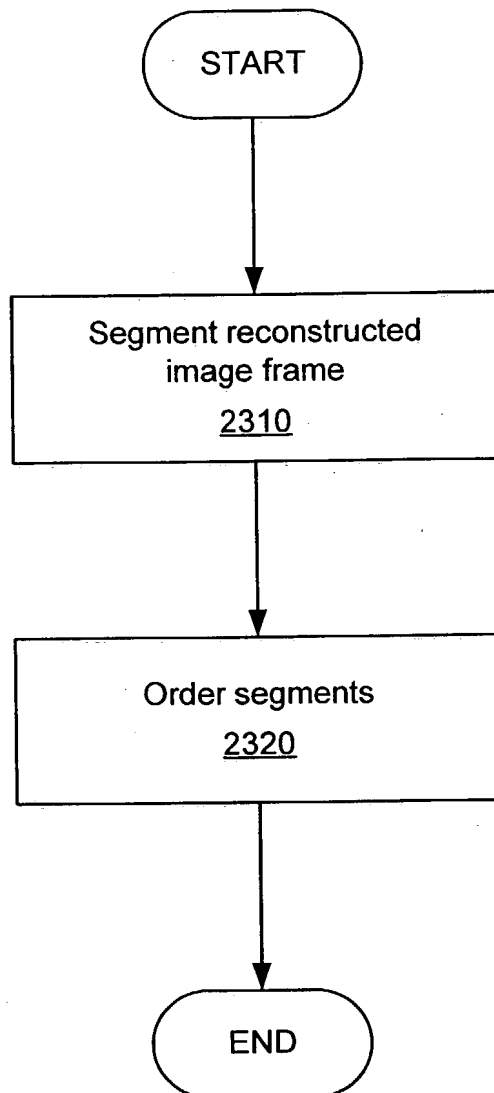


FIG. 23

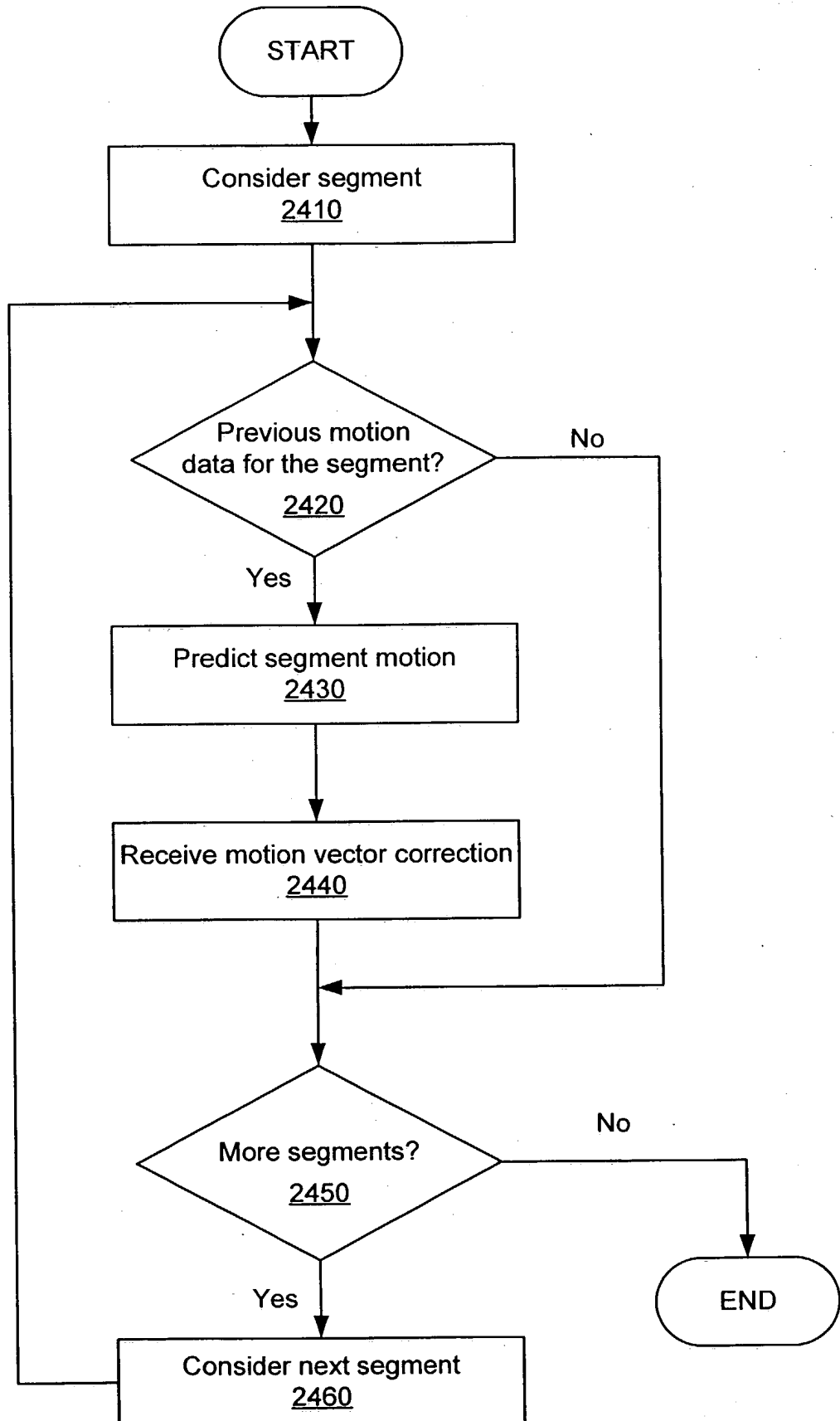


FIG. 24

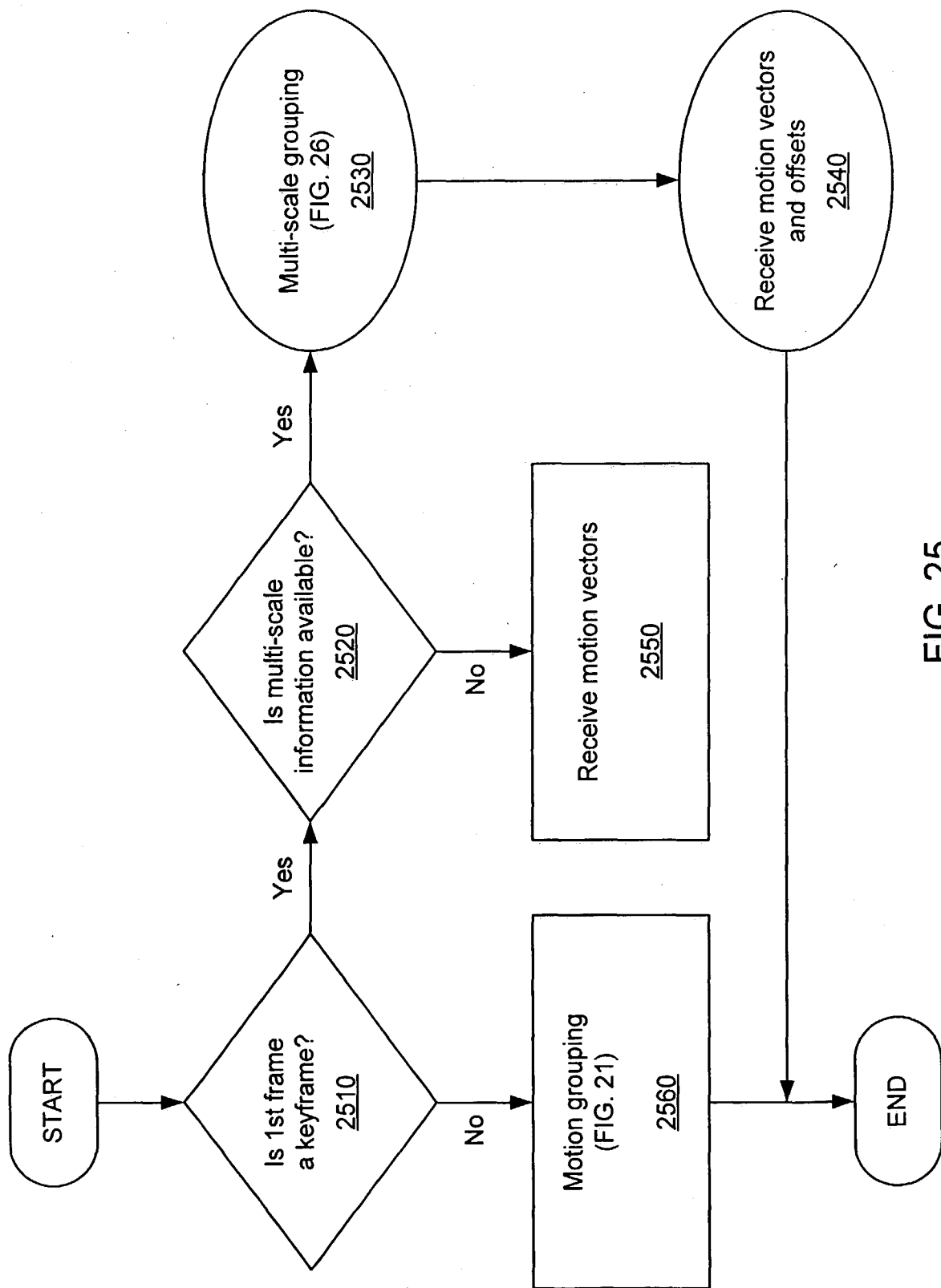


FIG. 25

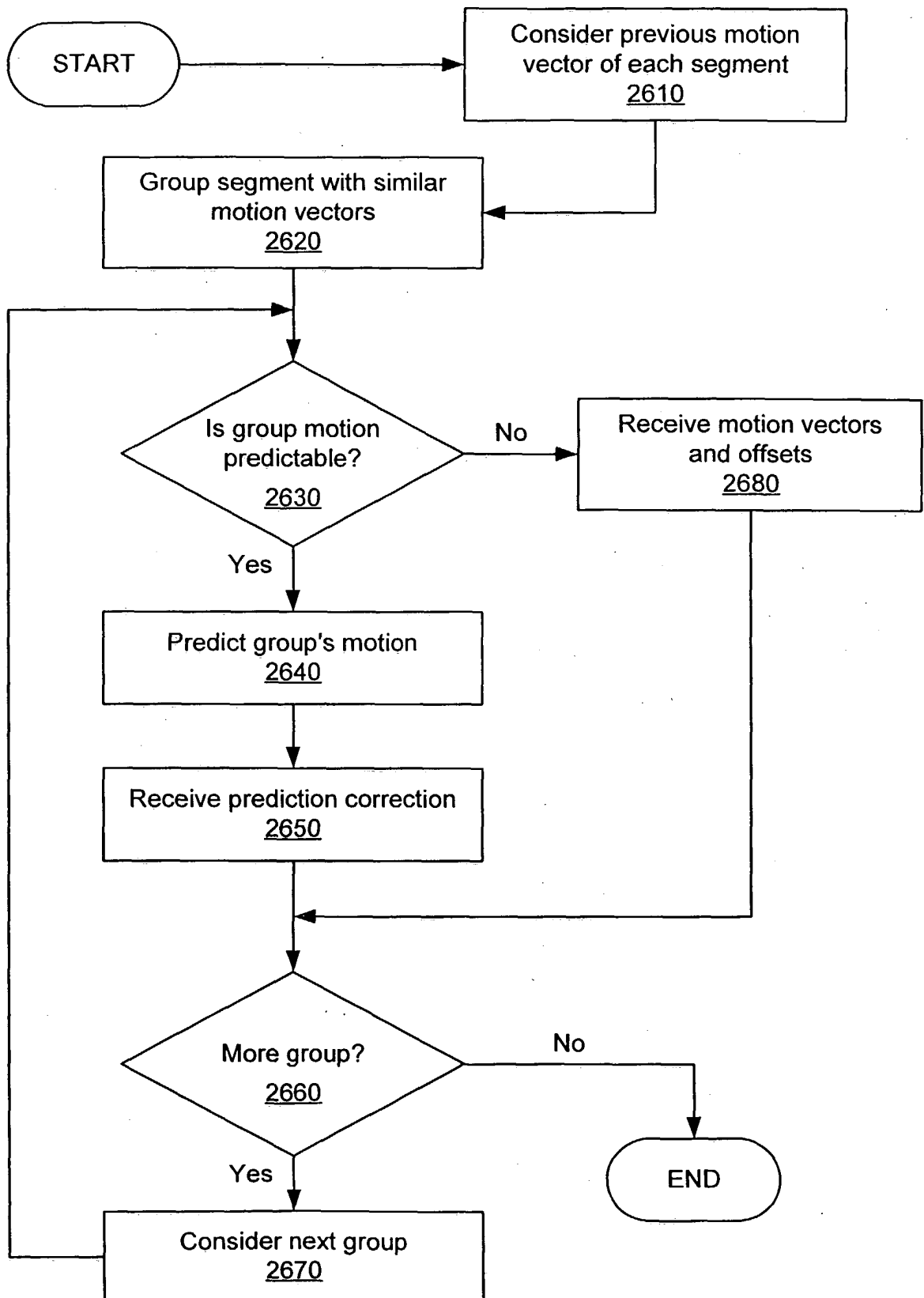


FIG. 26

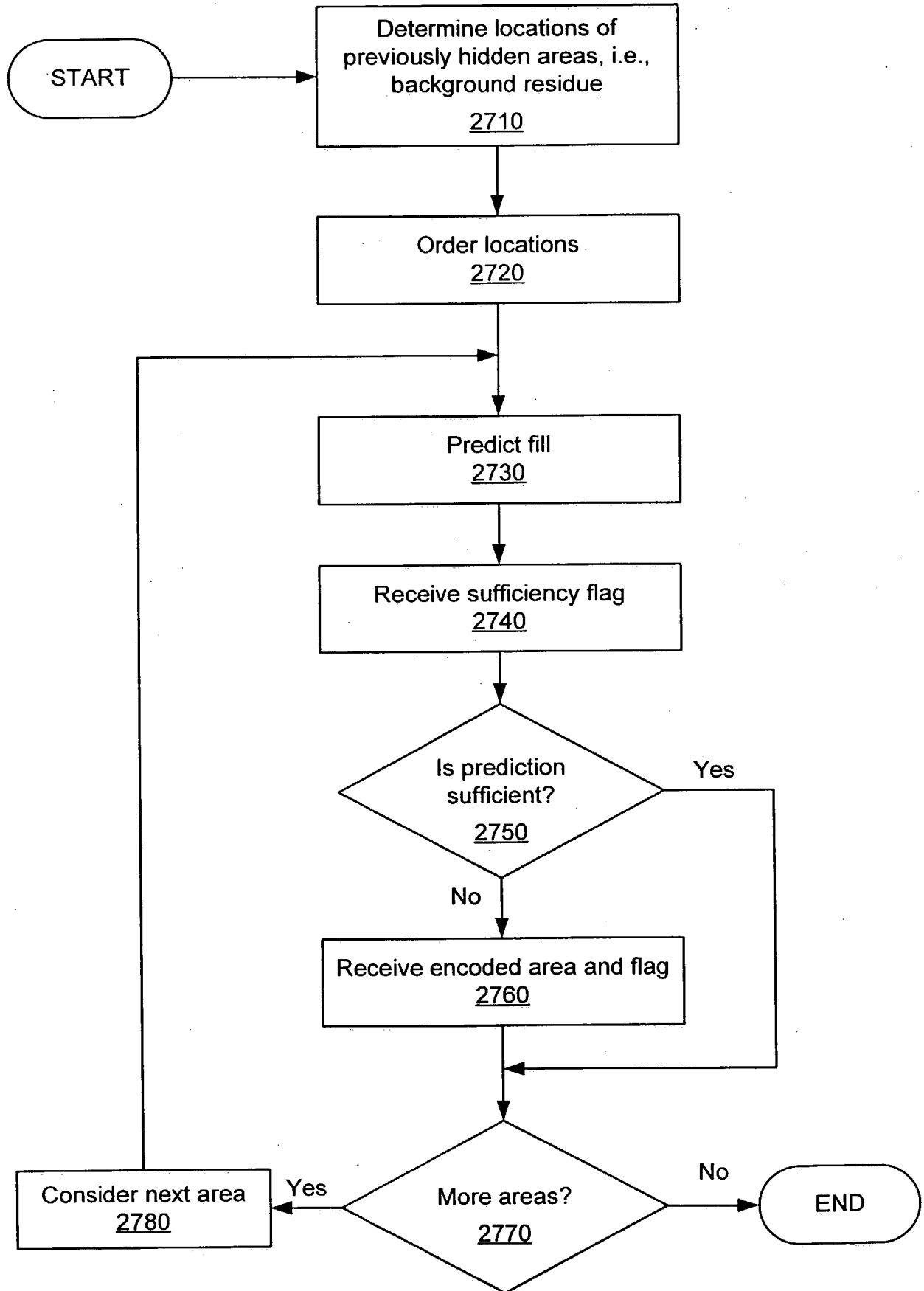


FIG. 27

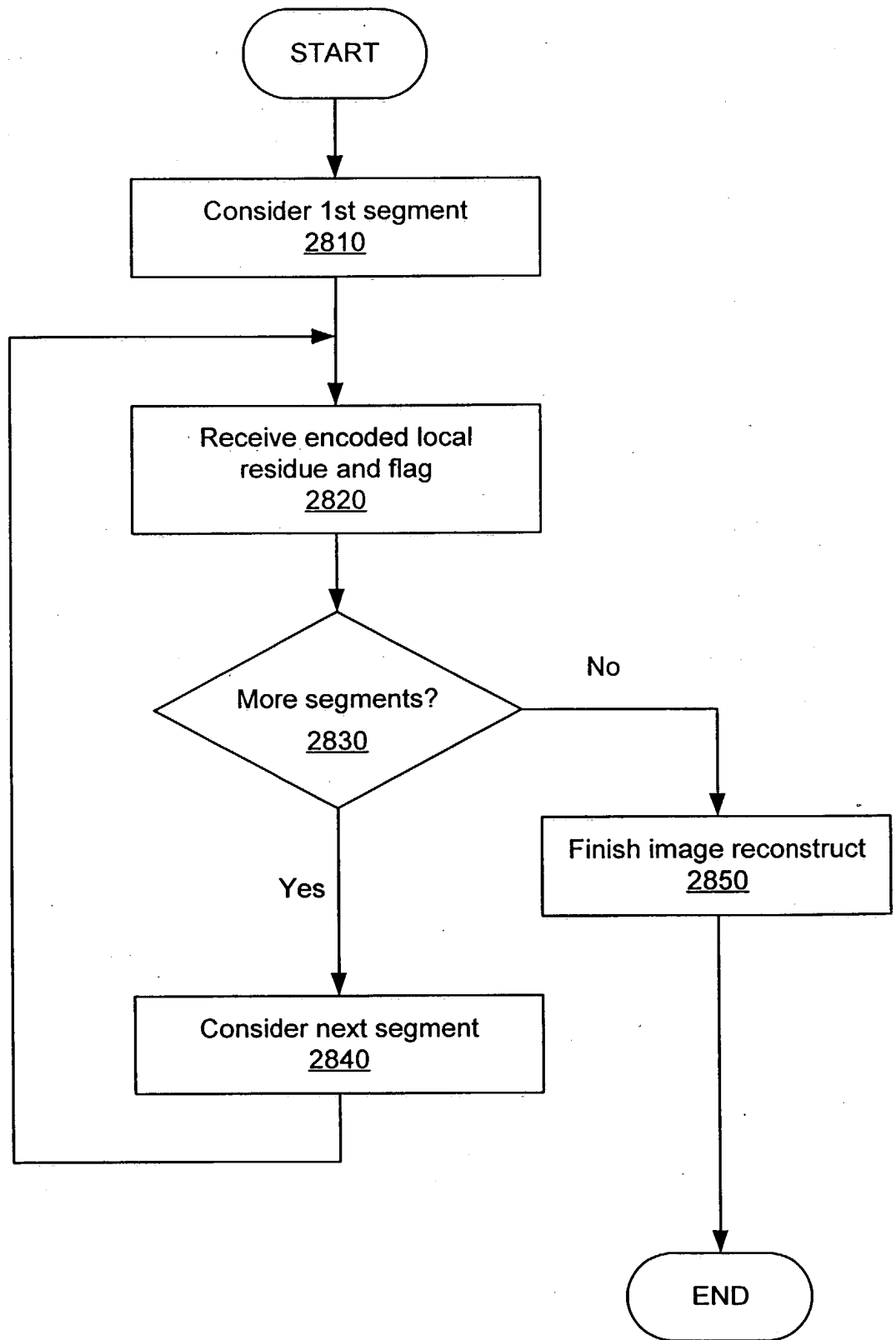


FIG. 28

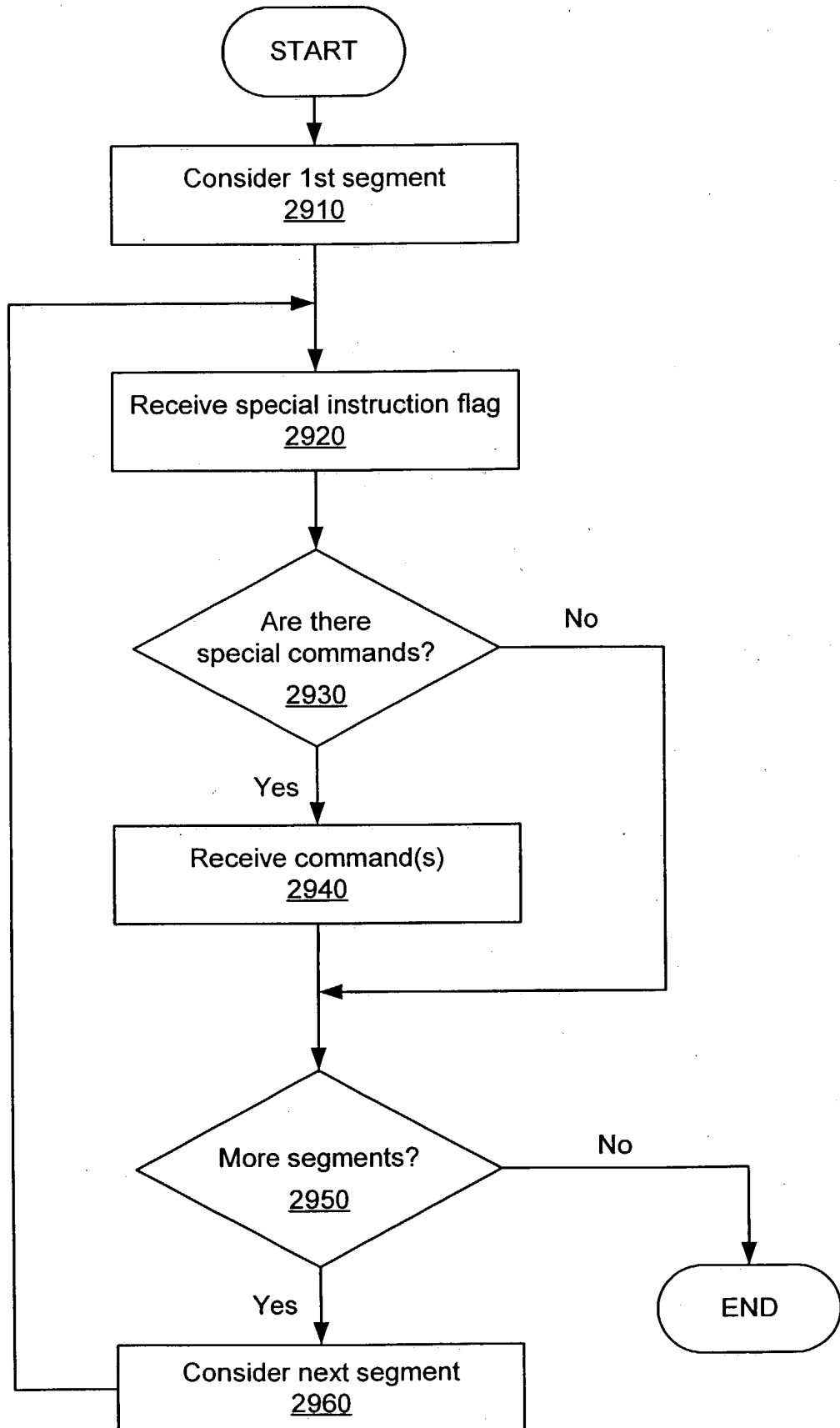


FIG. 29

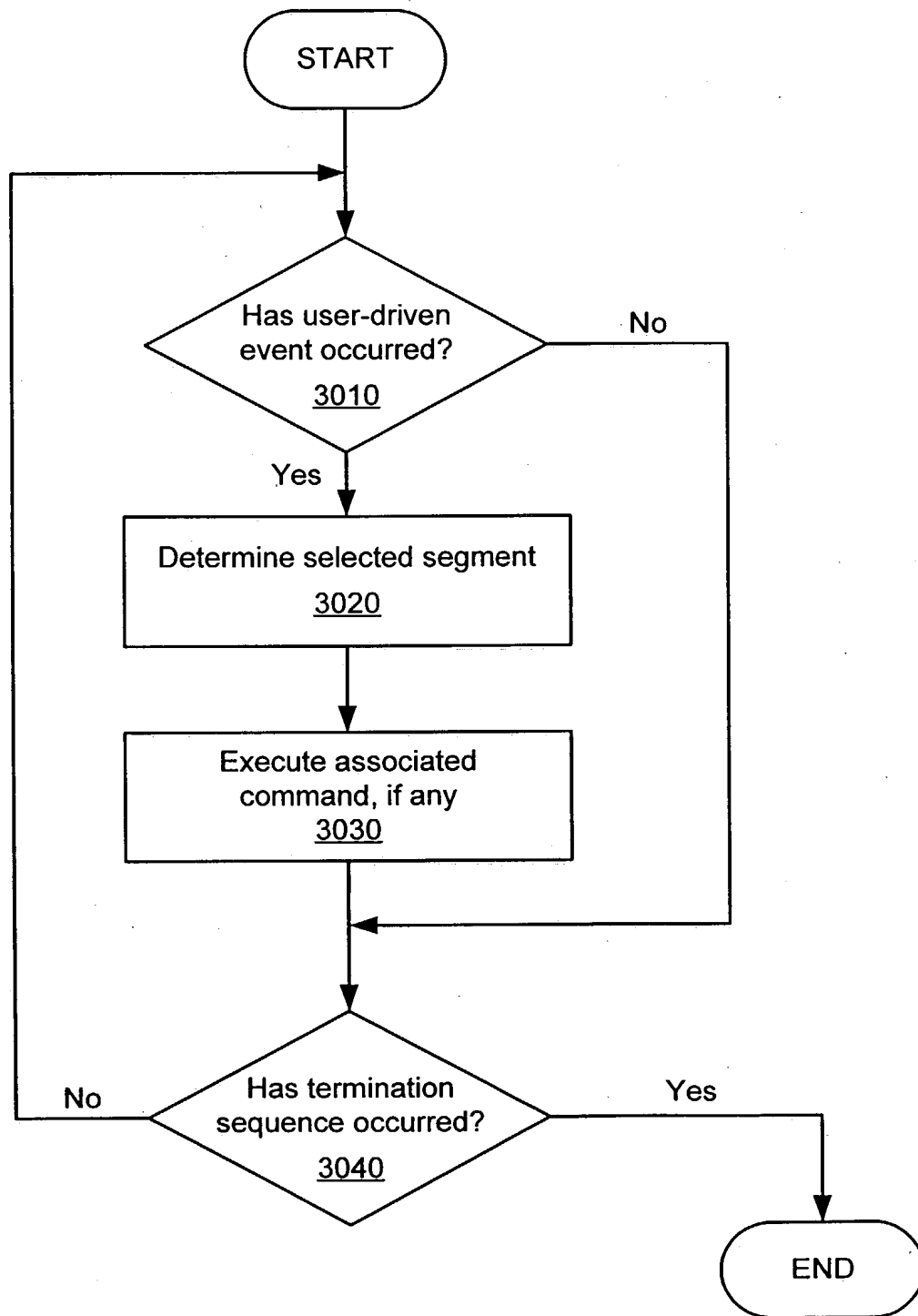


FIG. 30